Comparison of percutaneous versus open femoral cutdown access for endovascular repair of ruptured abdominal aortic aneurysms

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CME Activity

Purpose or Statement of Need The purpose of this journal-based CME activity is to enhance the vascular specialist's ability to diagnose and care for patients with the entire spectrum of circulatory disease through a comprehensive review of contemporary vascular surgical and endovascular literature.

Learning Objective

- Determine which patients with a ruptured AAA should have a percutaneous femoral access and which should have an open femoral access.

Target Audience This activity is designed for vascular surgeons and individuals in related specialties.

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ABSTRACT

Objective: Ruptured endovascular aortic aneurysm repair (REVAR) is being increasingly used to treat ruptured abdominal aortic aneurysms (rAAAs). However, the comparison between totally percutaneous (pREVAR) vs femoral cutdown (cREVAR) access for REVAR has not been studied. We used a national surgical database to evaluate the 30-day outcomes in patients undergoing pREVAR vs cREVAR.

Methods: Patients who underwent EVAR for rAAA between 2011 and 2014, inclusively, were studied in the American College of Surgeons (ACS) National Surgical Quality Improvement Program (NSQIP) targeted vascular database. Univariate and multivariate analyses were used to compare preoperative demographics, operation-specific variables, and postoperative outcomes between those who had pREVAR and cREVAR.

Results: We identified 502 patients who underwent REVAR, of which 129 had pREVAR (25.7%) and 373 cREVAR (74.3%). Between 2011 and 2014, the use of totally percutaneous access for repair increased from 14% to 32%. Of all patients undergoing REVAR, 24% had bilateral percutaneous access, 2% had attempted percutaneous access converted to

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cutdown, 64% had bilateral femoral cutdowns, and 10% had single femoral cutdown. Univariate analysis showed there were no significant differences in age, gender, body mass index, AAA size, or other high-risk physiologic comorbidities between the two groups. There was also no difference in rates of preoperative hemodynamic instability (48.1% vs 45.0%; $P = .55$) or need for perioperative transfusion (67.4% vs 67.8%; $P = .94$). There was a higher incidence of use of regional anesthesia for pREVAR compared with cREVAR (20.9% vs 7.8%; $P < .01$). The incidence of postoperative wound complications was similar between both groups (4.8% vs 5.4%; $P = .79$), whereas hospital length of stay was shorter in the pREVAR group (mean difference, 1.3 days). Overall 30-day mortality was higher in the pREVAR group (28.7% vs 20.1%; $P = .04$), and operative time was longer (mean difference, 6.3 minutes). However, when pREVARs done in 2011 to 2012 were compared with those done in 2013 to 2014, 30-day mortality decreased from 38.2% to 25.3% and operative time decreased by 25 minutes (188 to 163 minutes). Multivariate analysis showed there were no significant differences in mortality, wound complications, hospital length of stay, or operative time between pREVAR and cREVAR.

Conclusions: The ACS NSQIP targeted vascular database shows that there has been increased adoption of pREVAR in recent years, with improved mortality and operative time over the 4-year study period. At this point, pREVAR has not yet been shown to be superior to cREVAR for rAAA, but these outcome improvements are encouraging and likely attributable to increased operator experience. (J Vasc Surg 2017;66:1364-70.)

A ruptured abdominal aortic aneurysm (rAAA) is a highly morbid event, with mortality rates historically >80%. An estimated >50% of patients with rAAA never reach a hospital facility alive.[1] Mortality after surgical repair varies, with most larger retrospective series reporting mortality rates ranging from 40% to 50%.[2,3] Improved emergency medical services and critical care advances over the past several decades are thought to have improved this dismal prognosis.

In the current era of endovascular AAA repair (EVAR), percutaneous access to the femoral vessels has been increasingly used for elective EVARs. A multicenter randomized controlled trial with 151 patients at 20 institutions demonstrated that a totally percutaneous approach to elective EVAR (pEVAR) procedures had reached a success rate of >90%. This study further demonstrated a reduction in total procedure time with pEVAR and a trend toward decreased hospital length of stay compared with a femoral cutdown (cEVAR) approach.[4] Buck et al[5] reexamined this comparison of elective pEVARs with elective cEVAR in a large national database study. Their study demonstrated a mean 17-minute shorter operative time and shorter mean hospital length of stay with fewer postoperative wound complications in the pEVAR group.[5]

The first EVAR for a rAAA (REVAR) was reported by Marin and Veith[6] in 1994. Since then, EVAR to treat rAAAs has expanded, contributing to improved survival among those able to reach a facility where they can undergo definitive repair.[7,8] To date, no studies have compared pREVAR vs cREVAR for EVAR of rAAA. In this study, we used a national database to identify trends in the use of pREVAR for repair of rAAA and analyze outcome differences between the two access methods.

METHODS

Data source. We performed a retrospective review of the American College of Surgeons (ACS) National Surgical Quality Improvement Program (NSQIP) Targeted Endovascular Abdominal Aortic Aneurysm Repair ("EVAR") database encompassing all EVAR procedures performed at participating hospitals from January 1, 2011, to December 31, 2014, inclusively. There were 71 centers that participated in the targeted EVAR data set in 2011, and this rose to 75 centers participating in 2014. The ACS-NSQIP is a nationally validated, risk-adjusted, outcomes-based program to measure and improve the quality of surgical care in the United States. The first year that the procedure-targeted data were collected in NSQIP was 2011. This targeted database prospectively collects procedure-specific demographics, anatomic details, perioperative details, and 30-day postoperative outcomes data specific to those undergoing EVAR. The deidentified targeted database was merged with the same cases in the general participant use file by case ID, allowing for both procedure-specific and general perioperative variables and outcomes collected in NSQIP to be analyzed.

Data from NSQIP are available to those institutions actively reporting data and enrolled in the program. The data in both the general and procedurally targeted databases are collected and entered by surgical clinical reviewers who are certified by the ACS. Strict variable definitions are used when data are collected to ensure consistency across participating centers, and periodic auditing is used to ensure accuracy.[9] Analysis of the NSQIP database is exempt from requiring informed consent from individual patients, and therefore, this study did not require Institutional Review Board approval. No center or provider-specific data are thus available for patient privacy purposes.

Study cohort and variables. Patients who underwent EVAR between 2011 and 2014, inclusively, were identified from the NSQIP targeted database. Within the "EVAR" database, the indication for aneurysm repair included the following options: "diameter," "dissection," "embolization," "nonruptured symptomatic," "other," "prior endovascular intervention with unsatisfactory result," "thrombosis,"